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Article in *Psychology of Popular Media Culture* · February 2018

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10.1037/ppm0000182

Exploring the relationship between frequency of Instagram use, exposure to idealised images, and psychological wellbeing in women.

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### Abstract

Research on the mental health effects of social networking have predominantly focussed on Facebook, with limited research investigating the effects of Instagram on psychological wellbeing. This study aimed to address the link between Instagram use and a range of psychological variables in two parts. Participants were 129 women aged between 18 and 35 years. In part 1, women completed a series of questionnaires related to mental health outcomes and self-perceptions. Results showed that frequency of Instagram use is correlated with depressive symptoms, self-esteem, general and physical appearance anxiety, and body dissatisfaction; and that the relationship between Instagram use and each of these variables is mediated by social comparison orientation. In part 2, participants were exposed to a range of either beauty, fitness, or travel Instagram images (or a control condition with no images). Beauty and fitness images significantly decreased self-rated attractiveness, and the magnitude of this decrease correlated with anxiety, depressive symptoms, self-esteem and body dissatisfaction. Therefore, excessive Instagram use may contribute to negative psychological

outcomes and poor appearance-related self-perception, in line with previous research. The research has implications for interventions and education about chronic Instagram use.

*Keywords: Social Networking; Psychological Wellbeing; Online Behavior; Instagram*

**Public Significance Statement.** Instagram has features distinctive from Facebook, making investigation of the mental health effects of this medium worthwhile. Instagram use is correlated with a range of psychological wellbeing variables including depressive symptoms, anxiety, body dissatisfaction, and self-esteem. Exposure to idealised images leads to a decrease in self-rated attractiveness, implying chronic exposure may impact psychological health.

## Introduction

The appealing features of Social Networking Sites (SNS's), such as the ability to communicate with others despite geographical distance, have attracted billions of users worldwide, with many incorporating social networking into their daily routine (Boyd & Ellison, 2007). Between 2014 and 2015, 72% of Australians accessed the internet for social networking purposes, with younger age groups (< 35 years) being the heaviest internet users (Australian Bureau of Statistics, 2016). Indeed, 80% of university students use their devices (i.e., laptops, tablets, and mobile phones) for social networking purposes.

People who have a social networking account can create an online profile to share with other users who are already a part of their offline network, or to interact with new people. Not only are these digital avenues revolutionising how people interact, but they have also influenced the kind of material individuals choose to share (Vogel et al., 2014). That is, it is common to see users highlighting their individualism by posting socially desirable material that reflect an idealised lifestyle (Mehdizadeh, 2010). Given unlimited access to other users' profiles, people are likely to engage in social comparisons. Social comparison theory centres on the belief that individuals have an internal drive to gain accurate self-evaluations (Festinger, 1954), and do so by engaging in upwards social comparisons (i.e., comparing themselves to perceived superior comparators), or downwards social comparisons (i.e., comparing themselves to perceived inferior comparators). Thus, we may compare ourselves with others on social media as an avenue to determine our social and personal worth. These types of social media-based social comparisons, however, may lead to negative outcomes, particularly as individuals present their most 'ideal' selves on social media (Mehdizadeh, 2010), therefore inviting upwards social comparisons from others. While the effects of exposure to idealised images is well established (see Groesz, Levine, & Murnen, 2002 for a review of the effect of thin media images on body satisfaction), social media

platforms differ significantly from mass media outlets in how rapidly content is updated, and in the sheer number of potential comparators it is possible to be exposed to. Furthermore, whereas mass media typically portrays images of models and celebrities as idealistic standards of beauty, the world of social media is awash with ‘ordinary’ people who may be perceived as more ‘ordinary’ comparison targets. For example, excessive Facebook use has been proposed to promote high rates of social comparison (Liu, Li, Cacioppo, & North, 2016) and several studies have established a significant relationship between excessive Facebook use and psychological wellbeing variables. This includes depression (Błachnio, Przepiórka & Pantic, 2015; Steers, Wickham, & Acitelli, 2014), poor self-esteem (Błachnio, Przepiórka & Rudnicka, 2015), high anxiety (Labrague, 2014), high body dissatisfaction (Fardouly, Hershberg, Bhatia, & Halliwell, 2014), and low self-perceived physical attractiveness (Haferkamp & Krämer, 2011). As of yet, however, research has infrequently extended to the exploration of these outcomes in users of more recently developed SNS’s, such as Instagram. As such, this study explores the link between Instagram use and various measures of psychological wellbeing in women. We chose to study these effects in young women, since young women make up the majority of Instagram’s user base (Pew Research Centre, 2015), and tend to make more social comparisons than men (Gibbons & Buunk, 1999).

Despite Instagram’s shared functionality with Facebook (Wilson, Gosling, & Graham, 2012), there are some key differences that make exploration of Instagram users a worthwhile endeavour. Instagram was established in 2010 and has rapidly grown to 500 million users in 2016 (Statista, 2016). The functionality of Instagram is reserved to the sharing of photographs and short videos, and is commonly known for its utilisation of various photo-enhancing filters. These filters allow Instagram users to manipulate their photographs to be more visually appealing. Similar to Facebook, Instagram has a direct messaging function and

allows users to 'like' and comment on other users' photographs and videos. A more distinctive feature of Instagram, though, is the use of 'hashtags', with captions that create links to user content. The hashtag is placed in front of a word or phrase to identify either a keyword or highlight a topic of interest (Highfield & Leaver, 2015), for example, #fitness. As a result, global sharing of particular items, categorised with hashtags, occurs instantaneously, provided the user profile is made public. Uniquely, Instagram has a search and explore tab that shows photographs and videos from public profiles, based on the users' recent search history, and thus introducing users to new content without the need to search specifically for that content, further expanding the number of potential social comparison targets.

It is plausible that Instagram's appealing features, specifically being a forum for visual content, encourages users to engage in excessive social comparison, which can lead to negative outcomes (e.g., Lup, Trub, & Rosenthal, 2015). Previous research has demonstrated that visual information is remembered more readily than written information (Noldy, Stelmack & Campbell, 1990). Thus, Instagram's main feature of video and photo sharing may, in fact, be more harmful than other SNS's that have a focus on written content (status updates and wall posts) and sharing of links to other sites (such as news articles), rather than strictly visual displays. Lup et al. (2015) investigated this link, and found more frequent Instagram use was (marginally) positively associated with depressive symptoms, and negatively associated with social comparison, with Instagram use also having an indirect effect on depression, mediated by social comparison. Interestingly, Lup et al. found the proportion of strangers a user followed moderated these associations, with higher numbers of strangers increasing depressive symptoms and social comparison, and moderating the mediation between Instagram use and depressive symptoms by social comparison. Hence, Instagram use is related to poor psychological wellbeing via social comparison.

The use of Instagram hashtags has also led to trends on the SNS that may have negative outcomes for adult and adolescent women. For example, the trend ‘fitspiration’ (the amalgamation of the words fitness and inspiration) purports to act as motivation for others to pursue a healthier lifestyle, but the majority of these images contain very thin and toned women (Tiggemann & Zaccardo, 2016). As Tiggemann and Zaccardo (2016) discuss, exposure to images of thin idealised bodies can impact body image, and so the over-representation of these body types on Instagram could have negative effects. Furthermore, in an experimental study, Tiggemann and Zaccardo (2015) exposed women to fitspiration images, or travel images as a control. The researchers demonstrated that exposure to fitspiration images resulted in greater body dissatisfaction and lower state appearance self-esteem compared to exposure to travel images. Despite fitspiration imagery’s intent to encourage a healthy lifestyle, it may instead decrease the psychological health of its heavy consumers (Tiggeman & Zaccardo, 2016). These results are consistent with the interpersonal formulation of eating disorders theory (Rieger et al., 2010), which considers engagement in disordered eating in response to unsuccessful social interactions a psychological mechanism to repair self-esteem. Further to this, Turner and Lefevre (2017) found, for participants who followed healthy eating accounts on Instagram, a small but significant correlation between amount of time spent on Instagram and tendency towards orthorexia nervosa, an obsession with healthy eating. Finally, Hendrickse, Arpan, Clayton, and Ridgway (2017) have demonstrated that appearance-related social comparisons mediate the relationship between women’s Instagram photo activities, and strive for thinness and body dissatisfaction, while Brown and Tiggeman (2016) found that exposing women to celebrity and peer images on Instagram increased body dissatisfaction and negative mood, mediated by appearance comparisons. Thus, excessive use of social media that promote social comparison via visual mediums, could lead to negative psychological outcomes.

While the research discussed above has shown that social comparison behaviour on Facebook can impact an individual's mental health (including depressive symptoms, anxiety, body dissatisfaction, self-esteem, and self-rated physical attractiveness), relatively fewer studies have examined the effect of Instagram use on these outcomes, focussing so far on depressive symptoms and tendency towards orthorexia (see Turner & Lefevre, 2017), or on body dissatisfaction and strive for thinness (Brown & Tiggeman, 2016; Hendrickse et al., 2017). Since Instagram has slightly different functionality to Facebook, and is related to negative body image trends, such as #fitspiration, it is important to examine whether that exposure could have an effect on not only appearance-related anxiety and body dissatisfaction, but other measures of general psychological health. Given that social information presented through visual materials can provoke immediate social comparison, it can only be assumed that Instagram use will have links with psychological wellbeing, perhaps to an even greater degree than excessive Facebook use. To address this gap, the aim of this study was to identify whether a relationship exists between Instagram use and mental health outcomes including depressive symptoms, self-esteem, and general anxiety, as well as self-rated physical attractiveness, body dissatisfaction, and physical appearance anxiety. We also planned to test the extent to which these relationships are mediated by social comparison, similar to the relationship identified by other researchers (Lup et al., 2015). Finally, we explored whether exposure to Instagram images could have a discernible immediate effect on psychological outcomes, by asking participants to view a set of Instagram posts. Based on previous research demonstrating the link between Facebook use and psychological outcomes (as described above), we hypothesised that time spent on Instagram would correlate positively with depression, physical appearance anxiety, generalised anxiety, social comparison, and body dissatisfaction, and correlate negatively with self-esteem. Secondly, based on Tiggeman and Zaccardo (2015), we hypothesised that



exposure to images that invite upwards social comparisons (i.e., idealised fitness and beauty images) would decrease appearance self-esteem and self-rated physical attractiveness, and increase state and physical appearance anxiety, as compared to the travel images or the control group.

## Methods

Participants were 129 women ranging in age from 18 to 35 years ( $M = 24.60$  years,  $SD = 4.54$ ) who indicated they currently used Instagram. Participants were recruited from the authors' University undergraduate Psychology participant pool, as well as volunteers recruited via social networking sites and flyer advertisements on University campuses. The research was approved by the Institutional human ethics research committee, and all participants provided their informed consent. The study was hosted on SurveyMonkey and included two parts. Participation took approximately 30-40 minutes, and upon completion participants were presented with a debriefing statement regarding the nature of the manipulation.

### Part 1

**Materials and procedure.** Participants completed a survey containing the following scales presented in random order:

The 20-item Centre for Epidemiologic Studies depression scale (CES-D; Radloff, 1977) was used to measure depressive symptoms. Participants were asked to answer a number of questions relating to how they felt or behaved in the week prior, including "I felt depressed" and "I had crying spells", on a scale from 1(rarely or none of the time) to 4(all of the time). Higher scores indicate higher depressive symptoms. The CES-D had high internal reliability ( $\alpha = 0.93$ ).

The Heatherton self-esteem scale (SSES; Heatherton & Polivy, 1991) measures state self-esteem across three domains: performance, social interaction, and appearance.

Participants respond to 20 items such as “I feel self-conscious” and “I feel as smart as others”, on a five-point scale from 1(not at all) to 5(extremely). Higher scores indicate higher self-esteem. The SSES had high internal reliability ( $\alpha = 0.96$ ).

The State-Trait anxiety Inventory (STAI; Spielberger, 1983) is a commonly used measure of general anxiety and contains 20 items for assessing state anxiety and 20 for trait anxiety. Items include “I am tense”, and “I am a steady person”, which participants answer on a four-point scale from 1(almost never) to 4(almost always). Higher scores indicate greater anxiety. The STAI had high internal reliability ( $\alpha = 0.96$ ).

The physical appearance state and trait anxiety scale (PASTAS; Reed, Thompson, Brannick, & Sacco, 1991) measures an individual’s body image anxiety as they generally feel (trait) and as they currently feel (state). The trait scale asks participants to best indicate the extent to which they generally feel anxious, tense or nervous about specific body parts such as “my hips” and “my buttocks”, on a five-point scale from 1(never) to 5(always). The state scale asks how they feel about the same body parts “right now” on a scale from 1(not at all) to 5(exceptionally so). Higher scores indicate higher physical appearance anxiety. The scale had high internal reliability ( $\alpha = 0.91$ ).

Self-rated physical attractiveness was measured by two questions: “rate what you perceive to be your own physical attractiveness compared to your same sex friends”, and “rate what you perceive to be your own physical attractiveness compared to the general population”, on a scale from 1(extremely less attractive) to 9 (extremely more attractive). Scores were summed to create a single value for self-rated attractiveness. The items correlated strongly ( $r = 0.72$ ).

The Body Image Disturbance Questionnaire (BIDQ; Cash, Phillips, Santos, & Hrabosky, 2004) assesses concerns about physical appearance. The BIDQ consists of seven items such as “are you concerned about the appearance of some part(s) of your body, which

you consider especially unattractive?” which participants answer on a scale from 1(not at all concerned) to 5(extremely concerned). Higher scores indicate higher body image disturbance. The scale showed high internal consistency ( $\alpha = 0.93$ ).

Social comparison was measured using the Iowa Netherlands Comparison Orientation Scale (INCOM; Gibbons & Buunk, 1999), with 11 items measuring how frequently individuals compare themselves to others. Items include “I always like to know what others in a similar situation would do”, measured on a five-point scale from 1(disagree strongly) to 5(agree strongly). Higher scores indicate higher frequency of social comparison. The INCOM scale showed high internal reliability ( $\alpha = 0.83$ ).

Instagram use was measured using questions derived by the researchers. Items related to frequency of use. That is, “how many followers do you have on Instagram?” from 1(1-10) to 11(1000+), “how many accounts do you follow on Instagram?” from 1(1-10) to 11(1000+), and “in the past week, on average, approximately how much time per day have you spent actively using Instagram”, from 1(less than 10 minutes) to 6(more than three hours).

**Design.** Part 1 consisted of a correlational design, in which we correlated Instagram use with each of the psychological wellbeing variables, and with age. Since Lup et al. (2015) found that the relationship between Instagram use and depression was mediated by social comparison, we attempted to replicate these findings, as well as explore the mediation by social comparison of the relationship between Instagram use and other psychological wellbeing variables.

## Part 2

**Materials and procedure.** Instagram stimuli were selected by searching images from the Instagram database of public accounts. Three categories of images were sourced, obtained by using the hashtags #Beauty (beauty), #Fitspo (fitness) or #Travel (travel). Ten beauty images were selected on the basis that they showed a female’s face who was obviously

wearing makeup. Ten fitness images were chosen on the basis that they showed a female wearing work-out apparel who was either engaged in exercise or was based in a fitness centre setting. Ten travel images were selected that represented major travel destinations around the world, with many focussing on iconic landmarks and attractions, with no visible faces present in any images. Each of the 30 images was ‘framed’ using the standard Instagram frame, the original captions and usernames were removed, and the number of ‘likes’ was artificially inflated to increase the perception of popularity (i.e., 4,427 likes to 124,740 likes). An example of how the images were presented is shown in Figure 1. A manipulation check demonstrated these images best fit their allocated categories.<sup>1</sup>

After completing the scales in part 1 of the study, 35 participants were randomly assigned to the travel group, 30 to the beauty group, 28 to the fitness group, and 31 to the control group<sup>2</sup>. For the three image groups, participants were shown each of the ten images for their condition, in random order. To ensure participants viewed the images, they were presented with these images threefold. First, images were presented on a single page, with the instruction “please look at the following images carefully”. Secondly, images were presented again on a single page, with the instruction “please look at the following images carefully and click ‘like’ on only two of the images that you find the most appealing”. Finally, the images were presented with the instruction “please look at the following images carefully and write a comment on only two of the images that you find most appealing”. The control group did not view any images, and simply went on to answer the questions.

Following presentation of the images (or immediately after completion of the previous scales for the control group), the participants completed the SSES, the STAI (state),

<sup>1</sup> 14 participants (8 female,  $M$  age = 33.31,  $SD$  = 7.13) were asked to categorise the images as fitting into one of four categories: Travel inspiration, Makeup and Beauty, Fitness, or none. Each image was correctly categorised into their appropriate categories with inter-rater agreement between 67% and 100% ( $M$  = 90.2%).

<sup>2</sup> Six participants from part 1 did not complete part 2 (thus  $n$  = 123). *A priori* power analysis indicated a sample size of 40 participants would be required per group to detect an effect of medium size. Owing to attrition and incomplete data, actual power to detect a medium effect was approximately 0.68.

the PASTAS (state), and self-rated physical attractiveness scales a second time, in random order.

**Design.** In part 2 of the study, we investigated the effect of exposure to beauty, fitness, or travel images (or control) on the change in scores on the psychological wellbeing variables. Thus, for each of the variables of interest, a 2 (pre-image or post-image) x 4 (condition) mixed-model ANOVA was conducted.

## Results

### Part 1 - Instagram Use and Psychological Wellbeing

As shown in Table 1, average time spent on Instagram correlated positively with depressive symptoms, trait anxiety, social comparison orientation, physical appearance anxiety, and body image disturbance. Time spent on Instagram also correlated negatively with self-esteem, thus findings are consistent with the hypothesis. Exploring the other Instagram measures taken, we found that number of followers correlated positively with depression, trait anxiety, and negatively with self-esteem. Number of accounts followed correlated positively with depression and negatively with self-esteem. Additionally, age correlated negatively with Instagram use ( $r = -0.36, p < .001$ ), and negatively with social comparison ( $r = -0.21, p = .019$ ).

Similarly to Lup et al. (2015), we then explored the mediation of the association between social media use and psychological outcomes, by determining whether social comparison mediated the relationship between Instagram use and depressive symptoms, self-esteem, trait anxiety, physical appearance anxiety, and body image disturbance. Mediation analyses were conducted with Hayes PROCESS macro for SPSS, using Model 4 (for mediation) with 10,000 bootstrap samples. We included age as a covariate in every model, given age correlated with both Instagram use and social comparison (see above). We found a significant, partial, mediating influence of social comparison on the relationship between

Instagram use and depressive symptoms, self-esteem, and physical appearance anxiety.

Similarly, social comparison also had a significant fully mediating effect on the relationship between time spent on Instagram and trait anxiety and body image disturbance. Coefficient weights and effect sizes for each model are shown in Figure 2.

## Part 2: Effects of Image Exposure on Change in Psychological Wellbeing

To compare the effect of exposure to different categories of Instagram images (or no exposure in the control group) on self-esteem, appearance anxiety, self-rated attractiveness, and general anxiety, ANOVAs were conducted with measurement time (pre-image or post-image) within subjects, and condition (control, travel, beauty, or fitness) as the between subjects variable. The outcome of interest was the interaction between measurement time and condition.

No effect of condition on the change in self-esteem ( $p = .316$ ), appearance anxiety ( $p = .427$ ), or general anxiety (although general anxiety did approach significance,  $p = .062$ ) was observed, which was not in line with the hypotheses. However, a significant interaction between condition and measurement time was observed for self-rated attractiveness scores [ $F(3,116) = 3.18, p = .008, \eta^2_p = .096$ , observed power = 0.84]. Post-hoc simple main effects analysis (controlling for multiple comparisons) showed this was due to a significant decrease in self-rated attractiveness for those participants who were exposed to images in the beauty (difference score = -0.90  $p < .001$ ) and fitspo (difference score = -0.48;  $p = .047$ ) categories, but not the participants in the travel (difference score = 0.17,  $p = .418$ ) or control groups (difference score = -0.32;  $p = .175$ ). No difference between the beauty group and fitness group in the decrease in scores was observed. In order to explore which other psychological wellbeing variables might have been associated with the decrease in self-rated attractiveness, we selected only those participants who were categorised to the beauty or fitness conditions ( $n = 58$ ), and correlated change in self-rated physical attractiveness with each of the other

psychological wellbeing outcomes. As shown in Table 2, larger changes in self-rated attractiveness were associated with higher depressive symptoms, general anxiety, physical appearance anxiety, and body dissatisfaction, and with lower self-esteem scores.

## Discussion

### Instagram Use and Psychological Wellbeing

There is an array of evidence demonstrating excessive Facebook use is related to negative mental health outcomes (e.g., Błachnio, Przepiórka & Pantic, 2015; Błachino, Przepiórka & Rudnicka, 2015; Fardouly et al., 2014; Haferkamp & Krämer, 2011; Labrague, 2014). In Part one of this study, we demonstrated that heavier Instagram use (as well as number of followers, and number of people followed) correlated with a range of psychological wellbeing outcomes, including depressive symptoms, general anxiety, physical appearance anxiety, self-esteem, and body image disturbance. Previously, Lup et al. (2015) showed that the relationship between Instagram use and depressive symptoms was mediated by social comparison. Here, we discovered a similar relationship, with social comparison having a significant mediating effect on the relationship between Instagram use and depressive symptoms, as well as general anxiety, physical appearance anxiety, self-esteem, and body image disturbance. These results are also in line with previous research demonstrating that social comparison behaviour after exposure to social media has a negative effect on mental health (e.g., Feinstein et al., 2013; Labrague, 2014; Vogel et al., 2014). Similarly, Hendrickse et al (2017) found that appearance-related comparisons on Instagram mediated the relationship between Instagram photo activity and drive for thinness and body dissatisfaction.

This research is important as Instagram has some distinguishing features that set it apart from Facebook, and relatively fewer studies have focussed on Instagram. Importantly, Instagram is associated with a range of social trends, such as ‘fitspiration’, which can lead to

negative body image outcomes (Tiggemann & Zaccardo, 2015). Thus, excessive Instagram exposure may have an effect on other aspects of psychological wellbeing that extend beyond depressive symptoms, to self-esteem and body image (e.g., Hendrickse et al., 2017). While Facebook use is linked to negative outcomes, our assertion that exposure to visual media, specifically, can lead to negative outcomes, is complemented by research by Meier and Gray (2014). Meier and Gray showed that Facebook photo activity, rather than total Facebook activity, correlated positively with body dissatisfaction. Therefore, based on our findings, increased use of the image based platform Instagram, in which users post idealised images, is likely putting users at higher risk of negative outcomes than users of other forms of social media. While fewer studies have addressed the link between Instagram and psychological wellbeing, than Facebook, some recent studies have attempted to address this gap. For example, Lup et al. (2015) found a link between Instagram use and depressive symptoms (mediated by social comparison), Turner and Lefevre (2017) have found a link between Instagram use and tendency toward orthorexia nervosa, and Hendrikse et al. (2017) showed an association between Instagram photo activity and strive for thinness and body dissatisfaction, mediated by appearance-related social comparisons. Hence, the study reported here adds to a growing body of literature on the link between Instagram exposure and psychological wellbeing.

In our sample, younger participants spent more time on Instagram, and engaged in higher levels of social comparison. Although our sample was restricted to a young adult to adult demographic (i.e., age 18 to 35 years), these findings suggest that Instagram use could pose an even higher risk to psychological wellbeing in adolescents. For example, previous research has demonstrated that social comparison behaviour on Facebook has negative mental health effects among adolescents (Kraye, Ingledew, & Iphofen, 2007). However, research on the effects of Instagram use among different age groups is limited. Nevertheless,



a recent study (Nesi & Prinstein, 2015) found that adolescents who engaged in technology based social comparison (i.e., using Facebook and Instagram) and increased feedback seeking behaviour, experienced more depressive symptoms one year on. Gender and popularity were moderators of this effect, whereby females and less popular students expressed the highest rates of depressive symptoms. This also implies that the use of these media are causing, to some extent, the change in psychological wellbeing, rather than (or perhaps, in addition to) users selecting these sites because of low pre-existing psychological wellbeing.

In this study, we showed that number of followers also correlated with the range of psychological wellbeing variables. Since Facebook and Instagram users are likely to share positive and idealistic portrayals of themselves, teenagers may feel they are ‘missing out’ or ‘everyone is doing better’ than themselves when making social comparisons on line. This seems to relate to the extent to which individuals follow others who are unknown to them, with Chou and Edge (2012) showing that those who used Facebook for longer, and who followed more strangers, agreed more that others had better lives. These negative outcomes may be larger for teenagers who are less popular than their peers (Nesi & Prinstein, 2015).

Finally, while the aim of this research was to explore the effects of Instagram use on female psychological wellbeing, males are also prone to body dissatisfaction after exposure to idealised images (e.g., Galioto & Crowther, 2013; Hargreaves & Tiggeman, 2009), and social comparison can also mediate the link between social media use and depressive symptoms in men (Steers et al., 2014). Hence, it is worthwhile for future research to address the outcomes of excessive Instagram use in both adolescent samples and in males, including long-term impact.

### Effects of Image Exposure on Change in Psychological Wellbeing

In order to further explore the effects of Instagram use on mental health outcomes, we exposed participants Instagram posts in three conditions: fitness, beauty, travel; or no images

(in a control condition). Unlike Tiggemann and Zaccardo (2015), we found no decrease in self-esteem or increase in physical appearance anxiety. There are several possible reasons for this, potentially relating to presentation style. Firstly, in Tiggemann and Zaccardo's (2015) research, participants were exposed to 18 images. Here, participants were exposed to only 10 images. It is possible this exposure was not sufficient to induce the decrease in self-esteem, or the increase in physical appearance anxiety that was observed by Tiggemann and Zaccardo (2015). On the other hand, social comparison theory would suggest that upwards social comparisons would have a greater effect if comparison targets are similar to oneself (Festinger, 1954). Participants may not have felt sufficiently engaged with these images because the comparison targets were too dissimilar to them. However, brief exposure to these images *did* decrease self-rated attractiveness, implying that participants engaged in a re-evaluation of their notion of 'average' attractiveness and rated themselves accordingly. Since Instagram images are typically 'ideal' images, this leads to a contrast effect in which individuals rate themselves as less attractive (Gutierrez, Kenrick, & Partch, 1999). It is possible that chronic exposure to these images due to excessive use of Instagram, and the subsequent reconsideration of one's self-rated attractiveness would lead to more worrying changes in physical appearance anxiety, body image disturbance, and self-esteem. The results of part 1 support this assertion, since self-rated attractiveness correlated with each psychological wellbeing variable, and further, spending longer on Instagram each day correlated with every psychological wellbeing variable measured.

Post-hoc correlations for the beauty and fitness groups also revealed that the decrease in self-rated physical attractiveness was significantly related to all other psychological wellbeing measures. Thus, those with higher levels of depressive symptoms, lower self-esteem, higher anxiety, and lower body image satisfaction, showed greater decreases in self-rated physical attractiveness after exposure to beauty and fitness images. Thus, while we did

not observe a decrease in self-esteem or physical appearance anxiety after exposure to beauty and fitness images in this sample, there is still reason to believe that excessive exposure to idealised images on Instagram could have negative psychological outcomes. These results add to the growing body of literature on the effects of exposure to idealised images on Instagram on psychological wellbeing. If chronic exposure can lead to long-term changes in psychological wellbeing, then this has implications for both interventions regarding, and education surrounding, safe social-media use, particularly for adolescents.

While we completed this study in an online survey platform, future research should investigate the effects of exposure to idealised images in different presentation formats. For example, Vogel et al. (2014) created fake Facebook profiles and found exposure to individuals who appeared fit, healthy and attractive, resulted in lower self-esteem among participants. The complexity of these profiles may have increased their believability, and thus the tendency for participants to engage in social comparison behaviour, leading to a significant decrease in their self-esteem. In addition, viewing real Facebook profiles of physically attractive users has been found to trigger poorer self-perceived attractiveness (Haferkamp & Kramer, 2011), and other experimental methods requiring participants to use Facebook for 20 minutes in a laboratory setting, revealed state anxiety to be a risk factor for disordered eating (Mabe, Forney & Keel, 2014). Presentation format is potentially important, since Wan, Ansons, Chattopadhyay, and Leboe (2013) found that asking women to view some photographs of other women and rate their attractiveness, led to increases, rather than decreases in self-evaluations. This was in contrast to a condition in which women were asked to rate the suitability of the sunglasses worn by the models in the photographs, which led to a decrease in self-evaluations. In our experiment, the content presented were single Instagram images, on a platform designed for survey data collection, and not via the Instagram application. While this led to a decrease in self-rated attractiveness, increasing the

believability of these images as genuine social media posts in future research, perhaps by presenting them in a real Instagram account, will likely reveal changes in psychological wellbeing that are closer to those which occur during daily SNS use. Further, exploring the specific content of Instagram posts, which may activate different psychological defense mechanisms, would also help to clarify the extent to which exposure to Instagram is linked with wellbeing.

## General Discussion

The significant relationship between Instagram use and the psychological outcomes measured in part one of our study, as well as the decrease in self-rated physical attractiveness after exposure to beauty and fitness images in part two of our study, is in line with the wealth of research on the links between Facebook use and psychological outcomes, and the emerging literature on the links between Instagram use and psychological outcomes. This research implies that excessive exposure to Instagram can be damaging to users, especially when they engage in negative social comparisons. Exposure to content of idealistic beauty and fitness standards could be harmful in the long-term, considering the achievement of many of these ideals is unrealistic. This may be of particular importance in adolescents, who are heavy users of social media, and engage in more social comparisons than do older adults.

Despite some limitations, this study is important as it demonstrated a link between time spent on Instagram and a wide range of psychological wellbeing variables, which has not been explored extensively in the literature. Further, it implies that even brief exposure to idealistic images can result in re-evaluations of self-rated attractiveness, and therefore that chronic exposure may lead to more long-term changes in psychological wellbeing. Increased awareness of the impact of social comparisons on social media can be helpful to understanding the psychological wellbeing of young females who may be struggling to establish their identity, and may seek out comparison material on SNS's (see Shapiro &

Morgolin, 2014, for discussion). Our study complements research showing that excessive social media use can have an effect on psychological wellbeing. Given Instagram's popularity, it is unrealistic to expect individual's to cease use of the application. Therefore, research should focus on developing guidelines that outline the potential risks associated with excessive Instagram (and other social media) use. Providing users with more information about how their comparisons may moderate the effect of social media use on psychological wellbeing may help users make more informed choices. Further research examining other moderating or protective factors would therefore be valuable.

Funding: This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

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Tables and Figures

*Table 1.* Descriptive statistics for each scale, plus correlations between scales.

	Descriptive Statistics		Pearson's correlation coefficients								
	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8	9
1. Time spent on Instagram	2.65	1.65	---								
2. Number of accounts followed	7.06	2.69	0.58**	---							
3. Number of followers	6.97	2.43	0.53**	0.77**	---						
4. Depressive symptoms	22.65	12.77	0.49**	0.21*	0.22*	---					
5. Trait anxiety	49.88	11.93	0.42**	0.30**	0.28**	0.81**	---				
6. Physical appearance anxiety	41.55	13.47	0.47**	0.29**	0.16	0.48**	0.59**	---			
7. Body image disturbance	16.91	6.62	0.33**	0.26*	0.16	0.48**	0.63**	0.64**	---		
8. Self-rated attractiveness	8.21	2.91	-0.11	-0.05	0.11	-0.26**	-0.49**	-0.48**	-0.56**	---	
9. Self-esteem	59.91	17.77	-0.47**	-0.24**	-0.18*	-0.74**	-0.84**	-0.75**	-0.65**	0.55**	---
10. Social comparison	40.17	7.22	0.42**	0.25**	0.15	0.43**	0.59**	0.57**	0.43**	-0.28**	-0.62**

Note: \*\* $p < .01$ , \* $p < .05$

*Table 2.* Correlations between change in self-rated attractiveness after exposure to beauty or fitness images and psychological wellbeing measures.

	Change in self-rated appearance
Depressive symptoms	-0.37**
Trait anxiety	-0.32*
Physical appearance anxiety	-0.55**
Body image disturbance	-0.35**
Self-esteem	0.51**
Social comparison	-0.33*

\*\* $p < .01$ , \* $p < .05$

FIGURE TO COME

*Figure 1.* Stimulus example.

*Figure 2.* Mediation models including coefficient weights and model effect sizes for the relationship between Instagram use and psychological wellbeing outcomes. Dotted lines show coefficient weights for the direct relationship prior to mediation by social comparison.

\* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

